Stream Crossings

Best Management Practices
for water quality while harvesting forest products

Stream Crossings

HARVESTING ACTIVITIES, EXCEPT FOR THE NECESSARY AND PROPER INSTALLATION OF STREAM CROSSINGS STRUCTURES, MUST BE KEPT OUT OF STREAM CHANNELS. STREAM CROSSINGS ARE ONE OF THE PRIMARY WAYS FOR SEDIMENTS TO ENTER WATERCOURSES.

When properly located, constructed and maintained stream crossing structures can prevent damage to the bed and banks of streams, and control the movement of sediment into the water.

Stream crossings should be designed, constructed, and maintained to safely handle expected vehicle loads. When planning a stream crossing, it is important to consider the stream bottom materials, stream size, storm frequency, flow rates, and intensity of use (i.e., permanent or temporary).

Three common stream crossing structures include: bridges, ***fords*** and culverts. Temporary bridges are recommended for crossing ***perennial streams*** as they cause less modification of the stream and minimize disruption of fish passage. Fords and culverts are generally limited for use in ***intermittent streams*** where fish passage is not a concern. Culvert installation in a perennial stream that supports a fish population requires different instructions than those presented

in this section. For more information on the installation of culverts in perennial streams contact the Department of Environmental Protection Fisheries Division at (860) 424–3474.

Stream Crossing Planning

When planning, locating and constructing stream crossings, the following recommendations should be considered:

- Select a site for stream crossings prior to laying out the road system.
- Keep the number of crossings to a minimum.
- Cross the stream by the most direct route.
- Cross the stream at a 90-degree angle to the direction of stream flow.
- Locate the crossing where the approach has minimal slope.
- The single most effective practices in keeping sediment out of streams is to protect approaches to the crossing with stone, ***corduroy***, slash or other suitable materials.

Whether a bridge, culvert, or ford is planned to cross a stream, town Inland Wetlands Agency must be contacted to determine if the action is permitted as a right or if a permit is required.

- Locate a stream crossing where the stream channel is straight and has a gentle gradient.
- Locate the crossing in a flat area where floodwaters can disperse if the culvert or bridge's capacity is exceeded.
- Never follow streambeds or swales as skid trails.
- Locate road and trail drainages adequate distances from crossing structures to allow sufficient filtering of sediments to prevent them from entering waterways.

Stream Crossing Construction & Maintenance

- In-stream construction activities should be limited to periods of low or normal flow.
- Keep use of equipment in the stream to a minimum.
- Construct a bridge or place fill directly over a culvert higher than the road approach to prevent surface road runoff from draining onto the crossing structure and into the stream.
- Use soil stabilization practices on exposed soil at stream crossings. Apply seed and mulch and install temporary sediment control structures such as hay bales or silt fences immediately following construction to minimize erosion into streams. Maintain these practices until the soil is permanently stabilized.

- Keep culverts and bridges clear and free of debris so that water can pass unimpeded at all times.
- On unmaintained roads, it is recommended to use temporary crossing devices that are easily removed after use.

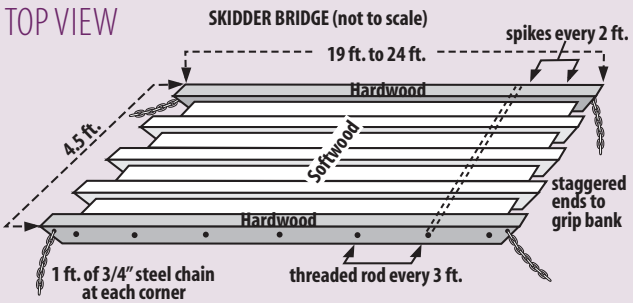
Temporary Portable Bridges

Temporary bridges make excellent stream crossing structures for roads and trails, and are preferred for crossing perennial streams. The installation and use of temporary bridges results in fewer disturbances to the stream channel and results in less soil disturbances than pipe culverts and fords. Effective temporary bridges can be made out of a variety of materials, such as: straight logs chained together or timber stock.

Temporary Portable skidder Bridge Guidelines

- For bridge spans that lay directly on the stream bank, the bridge must overlap the bank adequately to provide enough bearing length to support each side of the bridge.
- Anchor the bridge to ensure it does not move during a period of high water.
- The bridge must sit level side-to-side and end-to-end and provide sufficient clearance for unobstructed stream flow.
- To prevent the logs from sliding off bridges during skidding use large hardwood timbers, poles or cull trees on the outside edges.

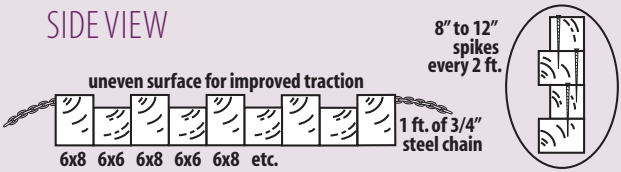
Temporary Portable Bridge Diagram



Assembly:

Predrill and inset 3/4" threaded steel rods every 3' and secure with at least one nut. To increase rigidity, nail individual timbers together every 2' with 8" to 12" barn spikes. This prevents flexing between the threaded rods.

- **Most loggers use a two-piece bridge, dragging both pieces into place with the skidder, or moving them with a forwarder.**
- **Longer is better, as long as it can fit on a log truck.**
- **Many loggers own two bridges, one short [19'] and on long [24'].**
- **Proper installation is very important; a bridge must be level, and provide sufficient clearance for stream flow.**
- **Use larger hardwood timbers on the outside edges for strength, to prevent the hitch from sliding off, and to make it easier for the grapple to grab.**
- **Use softwood timbers on the inside to minimize weight, make drilling easy, and keep the cost down.**



- **Alternate 6x6' and 6x8' softwood timbers on the inside to create an uneven surface for better traction.**
- **Provide for water drainage to prevent rot.**
- **Staggered and beveled ends of the bridge grip the bank and lie flat.**
- **Use 1' of 3/4" chain on the corners to be able to skid the sections from the landing, and hold the two pieces of bridge together.**

- Apply materials such as poles or cull logs perpendicular to the direction of travel on the bridge approaches to reduce the potential for sediment being dropped from the tires onto the bridge deck and washed into the stream.
- Keep the bridge deck free and clear of debris and soil.

Fords

Truck Roads

The use of Fords for truck roads is an acceptable alternative for crossing intermittent streams under the following conditions:

- The streambed has a rocky or coarse gravel bottom, and the approaches are low and stable enough to support traffic.
- The approaches are of nonerodible materials, and should extend 50 feet or more on both sides of the crossing. Stabilizing materials may include crushed rock, riprap, rubber mats or geotextiles.

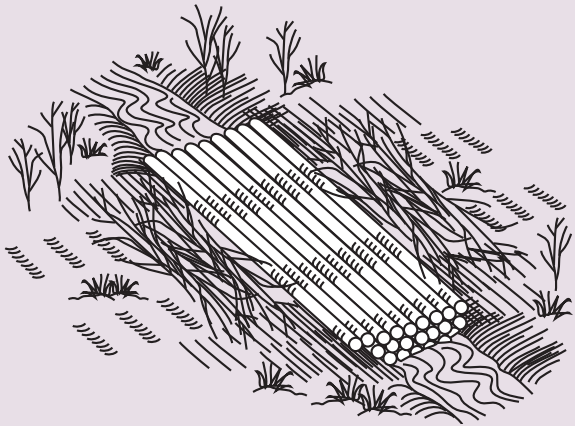
- As an alternative, fords may utilize a temporary corduroy crossing consisting of pole size trees, cull logs, or other materials such as tire mats.

Skid Roads

Poled fords can also be used temporarily for forwarding logs across intermittent streams. To minimize soil disturbance and root mass destruction, a corduroy consisting of pole size, pipe bundles, or cull trees is placed in the streambed perpendicular to the direction of travel. The diameter of the poles must be large enough so that the equipment tires or tracks are kept above the surface of the water and roughly level with the adjoining stream banks. Often, a metal pipe is inserted in place of one pole to provide temporary passage for any water that may build up.

It is critical that measures be taken to protect the approaches and prevent tires or tracks from carrying or dragging soil onto the crossing structure. Extend the corduroy onto the stream banks or line the approaches with slash far enough to permit soil to fall off prior to reaching the crossing structure.

PIPE BUNDLE CROSSING



Culverts

Pipe culverts are an acceptable method for crossing intermittent streams. Installation of a culvert in a perennial stream that supports a fish population requires different construction methods than presented in this manual to ensure that fish passage is not interrupted. For more information on the installation of culverts in perennial streams contact the Department of Environmental Protection Fisheries Division at (860) 424-3474.

Installation of Culverts (For use in intermittent streams only)

- Culvert openings should be large enough to carry all of the runoff that may accumulate above the culvert inlet during severe rain events.

Recommended Culvert Size by Upstream Area

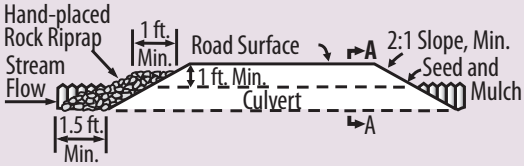
Watershed Area Above Pipe Inlet (Acres)		
Gentle Terrain & Deep Soils	**Steep Slopes, Wetlands or Thin or Hardpan Soils**	**Recommended Pipe Diameter (Inches)**
16	4	15
25	7	18
40	12	21
55	16	21
84	27	30

Source: Hartung, R.E., and Kress, J. m., 1977. Woodlands of the Northeast – Erosion and Sediment Control Guides, U.S.D.A. Natural Resources Conservation Service and Forest Service.

- Position culvert as near as possible to the natural stream channel and no lower than the streambed.
- Install culverts so there is no change in the stream bottom elevation. Culverts should not cause damming or pooling.

- A settling basin should be constructed at the inlet, and may also help at the downstream end of the culvert to trap suspended sediment. Settling basin inlets and outlets should be protected with riprap, be properly maintained and kept clear of any debris that may block water flow.
- The culvert should rest on a smooth, firm surface.
- Culverts should extend beyond the fill bank by at least 1 foot.
- Culverts for stream crossings should be no smaller than 15" in diameter and 18" if there is evidence of a defined stream channel.
- The culvert fill should be compacted at least halfway up the sides of the pipe with clean fill to prevent seepage.
- The top of the culvert should be covered with fill to a depth of at least one foot, or half the culvert's diameter, which ever is greater, to protect the culvert from being crushed by vehicles.
- A headwall of laid stone, concrete, ***riprap,*** or logs should be built if the stream has sufficient force during heavy rain events to cause erosion. The headwall will also prevent the crushing of the inlet pipe.

CROSS SECTION A-A



Install culvert so that there is no change in the stream bottom at the culvert inlet and outlet.

TYPICAL ROAD CROSS-SECTION AT STREAM CROSSING